CALIFORNIA FIRE SCIENCE CONSORTIUM

JOINT FIRE SCIENCE PROGRAM

Research Brief for Resource Managers

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A Century of Fire Ignition Causes in California: Sources are Changing

Keeley, Jon E., and Alexandra D. Syphard. 2018. Historical patterns of wildfire ignition sources in California ecosystems. International Journal of Wildland Fire 27: 781-799. DOI: 10.1071/WF18026

In drought-stressed California, big deadly fires are on the rise. This has led to an emphasis on fuel treatments as the favored solution, although on many non-forested landscapes fuels are not the limiting factor. Rather, the only real alternative for these ecosystems is to reduce ignitions and stop fires from starting at all. To best do this, these authors contend that the first step to improving fire prevention is to understand how the spatial distribution of different ignition sources have varied over time and space. Specifically, they've sorted ignitions by source, state and federal lands, and regions across all of California for the last 100 years.

Most importantly they have shown that across the state the primary sources of ignition vary, with natural lightning ignitions being prominent in the higher mountains of the Sierra Nevada and further north (Fig. 1). Human ignition sources vary regionally and include direct ignitions like arson as well as indirect sources from human infrastructure such as powerlines.

Perhaps most surprising was the marked temporal changes in different ignition sources. Overall, the number of ignitions has declined in the last four decades, suggesting important headway is being made in fire ignition prevention.

Management Implications

- From the early 1900's to 1980, the number of ignitions rose in concert with population increase.
- From 1980 to 2016, the total number of ignitions decreased, despite continued population increase. However, the source has changed.
- Powerline ignitions, the source of four of the biggest conflagrations in the last decade, have not declined and in some regions has increased. It appears this is due in large part to the fact that these powerline failures occur during extreme wind events.
- While agencies have made strides in reducing ignitions, the ever-increasing population density has apparently increased the chances of ignitions during extreme conditions.

However, one ignition source– powerline ignitions– have continued to rise in number and area burned through the 20th and 21st century (Figure 2).

Further, the authors have examined how different ignition sources have varied relative to annual climatic variation.

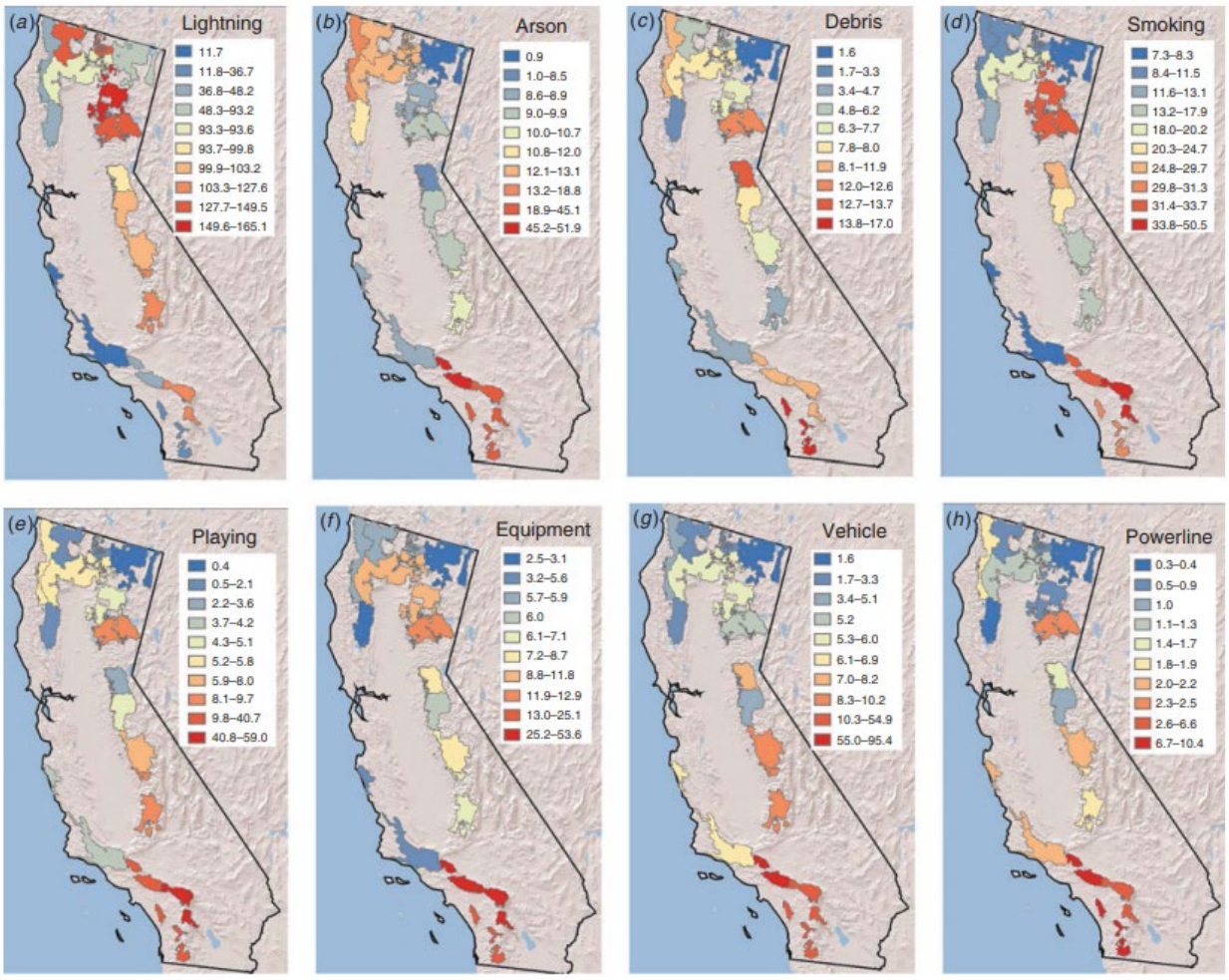

Fig. 1. Fire frequency for different ignition sources on USFS protected lands in California for the years 1910–2016 (n/year/106 ha); note change in scales for each source.

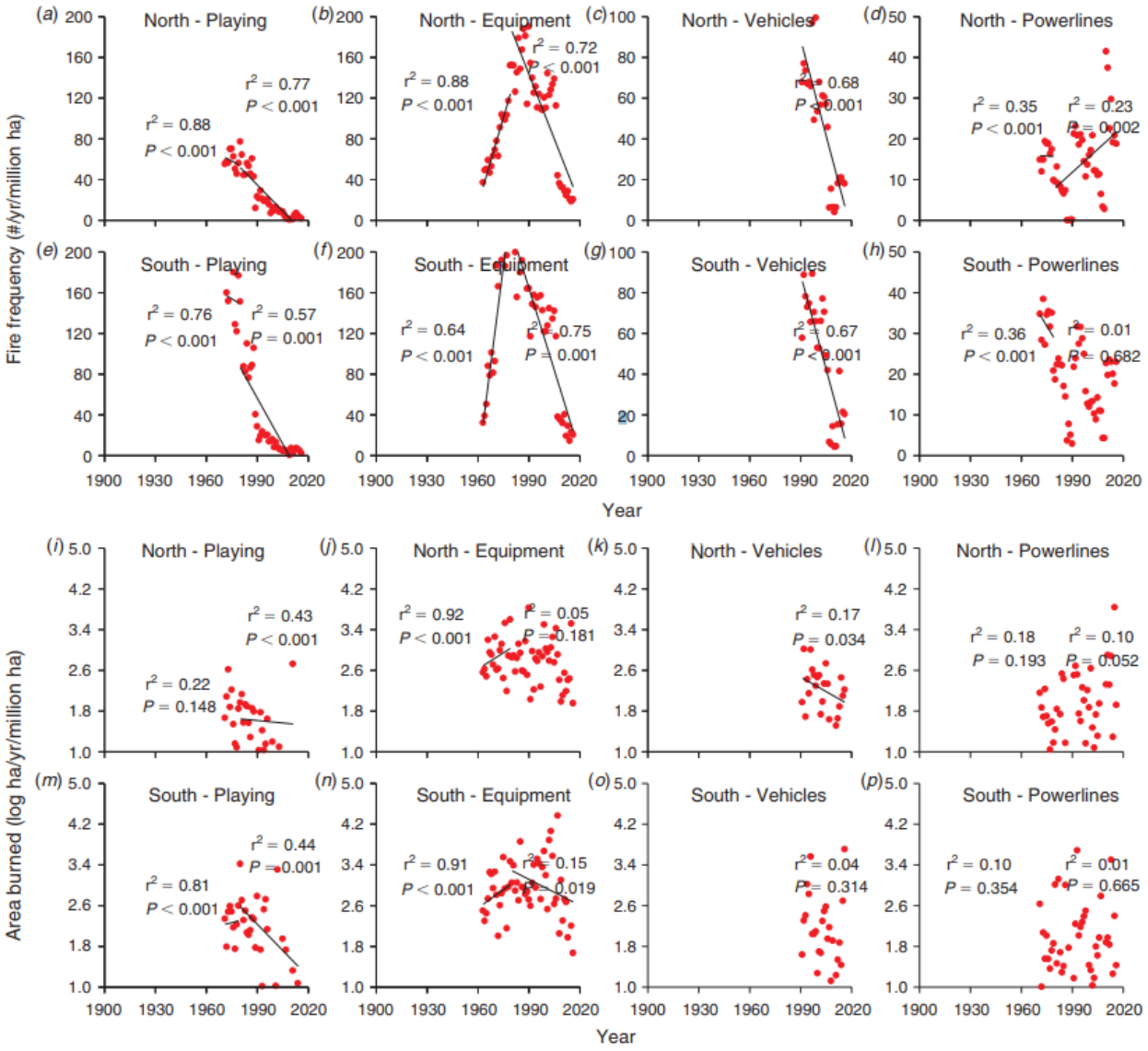

Fig. 2. Ignition sources variously recorded throughout the period 1910–2016 on USFS lands by frequency (a–h) and area burned (i–p) in the north (climate divisions North Coast, North Interior and Sierra Nevada) and the south (Central Coast and South Coast) with lines for significant regressions before 1980 and 1980–2016; note the change in scale for fire frequency.